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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/972,142	10/05/2001	Daniel A. Loffler	220772007420	5182
25226	7590	07/19/2005		
MORRISON & FOERSTER LLP 755 PAGE MILL RD PALO ALTO, CA 94304-1018			EXAMINER KERNS, KEVIN P	
			ART UNIT	PAPER NUMBER
			1725	

DATE MAILED: 07/19/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/972,142

Applicant(s)

LOFFLER ET AL.

Examiner

Kevin P. Kerns

Art Unit

1725

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
  - If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
  - If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
  - Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 16 May 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-49 is/are pending in the application.
- 4a) Of the above claim(s) 25-48 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-24 and 49 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☒ Claim(s) 1-49 are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 05 October 2001 and 16 May 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>5/16/05</u> . | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Election/Restrictions***

1. Claims 25-48 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to several non-elected species (Groups Ib, Ic, IIa, and IIb), there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on October 12, 2004. The applicants' request for rejoinder in the response of May 16, 2005 is not timely, as no remarks/arguments were presented in their earlier reply of October 12, 2004. Furthermore, request for rejoinder under MPEP 821.04 applies to product-by-process and process claims, not apparatus and process claims. The restriction requirement of July 12, 2004 is still deemed proper and is therefore made FINAL. A complete reply to the final rejection must include cancellation of nonelected claims or other appropriate action (37 CFR 1.144). See MPEP § 821.01.

### ***Claim Rejections - 35 USC § 103***

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation

under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

4. Claims 1-24 and 49 are rejected under 35 U.S.C. 103(a) as being unpatentable over any one of Hamada et al. (US 5,609,834), Furuya et al. (JP 6-111838), or Nakamura et al. (JP 6-219703), in view of Hunter et al. (US 4,214,867).

Hamada et al. disclose a plate reformer for conducting simultaneous endothermic (steam reforming) and exothermic (combustion) reactions via a stack of bicatalytic reactor cells that include a series of first and second reactor channels; a plate-shaped reforming chamber 2 sandwiched between a pair of plate-shaped combustion chambers 4, all of which contain respective heat exchange sections (plates 5); a plurality of coated thin metal, heat-conductive separator plates and fuel distribution plates 6 for transverse flow of a reaction stream, and forming corrugated regions via a plurality of spheres; a heater operative to preheat a reaction stream; and an inlet and an outlet for the exothermic and endothermic reaction streams, such that the bicatalytic reactor cell is operative to supply an anode 41a of a fuel cell 40 with hydrogen gas (abstract; column 1, lines 6-9; column 2, lines 66-67; column 3, lines 1-67; column 4, lines 1-31 and 55-67; column 5, line 1 through column 8, line 54; and Figures 1-3).

In addition, Furuya et al. disclose a reforming system for supplying a fuel cell system, in which reforming catalysts are placed on the grooves of one side plate and

Art Unit: 1725

combustion catalysts are placed on the grooves of the other side plate, creating reaction fluid flow passages, with the reforming system operative to conduct simultaneous endothermic (steam reforming) and exothermic (combustion) reactions via a stack of bicatalytic reactor cells that include a series of first and second reactor channels; a plate-shaped reforming chamber and a combustion chamber, both of which contain heat exchange sections; a plurality of coated thin metal, heat-conductive separator plates and fuel distribution plates for transverse flow of a reaction stream, and forming corrugated regions via a plurality of spheres; and a heater operative to preheat a reaction stream; and an inlet and an outlet for the exothermic and endothermic reaction streams, such that the bicatalytic reactor cell is operative to supply an anode of a fuel cell with hydrogen gas (abstract; and Figures 1-19).

Also, Nakamura et al. disclose a miniaturized fuel reformer for conducting simultaneous endothermic (steam reforming) and exothermic (combustion) reactions via a stack of bicatalytic reactor cells that include a series of first and second reactor channels; a plate-shaped reforming chamber and a plate-shaped combustion chamber, both of which contain heat exchange sections; a plurality of coated thin metal, heat-conductive separator plates and fuel distribution plates for transverse flow of a reaction stream, and forming corrugated regions; a heating unit 112 operative to preheat a reaction stream; and an inlet and an outlet for the exothermic and endothermic reaction streams, such that the bicatalytic reactor cell is operative to supply an anode of a fuel cell with hydrogen gas (abstract; and Figures 1-4).

Although neither Hamada et al., Furuya et al., nor Nakamura et al. discloses the specific metal alloy materials, thicknesses and distances between the thin metal separators, and the herringbone pattern of the flow of the reaction stream, one of ordinary skill in the art would have recognized that the specific metal alloy material, thicknesses/distances of the thin metal separators, and a herringbone pattern of flow (as compared to conventional parallel flow), would have been obvious to obtain a more efficient and miniaturized bicatalytic reactor cell

Neither Hamada et al., Furuya et al., nor Nakamura et al. specifically discloses the amended claim 1 limitations that include at least a portion of a first catalyst-coated surface is directly opposite at least a portion of a second catalyst-coated surface on opposing sides of a separator that is shaped to form corrugations.

However, Hunter et al. disclose a method and apparatus for catalytic heat exchange, in which a separator is coated with catalyst to form directly opposed surfaces for heat exchange, in which the separator (membrane) is in the form a corrugated metal strip or foil, which is advantageous for providing improved catalytic combustion and heat exchange for carrying out simultaneous reactions (abstract; column 1, line 14 through column 6, line 62; and Figures 1-3).

It would have been obvious to one of ordinary skill in the art at the time the applicants' invention was made to modify the respective structures of the reformers disclosed by any one of Hamada et al., Furuya et al., or Nakamura et al., by using the separator (membrane) formed of corrugated metal strip or foil to form directly opposed surfaces for heat exchange, as taught by Hunter et al., in order to provide improved

Art Unit: 1725

catalytic combustion and heat exchange for carrying out simultaneous reactions (Hunter et al.; abstract; and column 6, lines 44-62).

### ***Response to Arguments***

5. The examiner acknowledges the applicants' amendment, replacement drawing sheets, and an additional Information Disclosure Statement, all of which were received by the USPTO on May 16, 2005. The IDS has been considered and initialed, and a copy of the initialed IDS is provided with this Office Action. The replacement drawing sheets are approved, and thus overcome prior objections to the drawings. The amendments overcome prior objections to the abstract, specification, and claims. A response to the applicants' request for rejoinder (pages 17 and 18 of remarks) is presented in above paragraph 1. Claims 1-24 and 49 remain under consideration in the application.

6. Applicants' arguments with respect to claims 1-24 and 49 have been considered but are moot in view of the new ground(s) of rejection. Rejections based on the Koga et al. reference (see prior Office Action) have been withdrawn due to lack of specifically defined catalyst-coated surfaces.

### ***Conclusion***

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. US 5,470,542 is also cited in PTO-892.

8. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dr. Kevin P. Kerns whose telephone number is (571) 272-1178. The examiner can normally be reached on Monday-Friday from 8:00am-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Dunn can be reached on (571) 272-1171. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.



Art Unit: 1725

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Kevin P. Kerns *Kevin Kerns 7/15/05*  
Primary Examiner  
Art Unit 1725

*KPK*  
kpk  
July 15, 2005